Cyclodextrin inclusion complexes: from aqueous solution to non-conventional media

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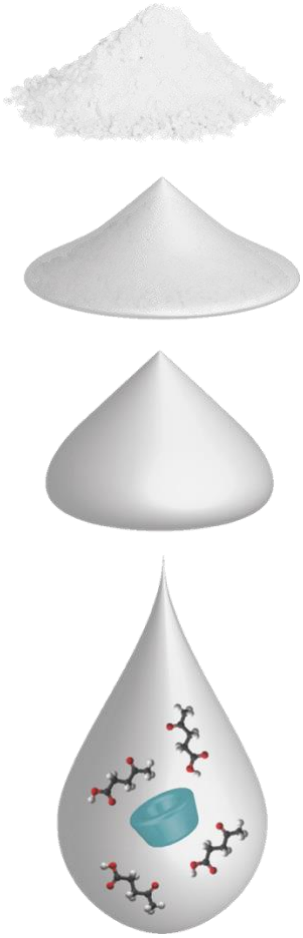

Cyclodextrins (CD) are a well-known family of cyclic oligosaccharides obtained from the enzymatic degradation of starch[1]. They possess a truncated conical structure with different cavity sizes. Their relatively hydrophobic cavity associated to the hydrophilic outer surface, enable them to form inclusion complexes in aqueous solution with a wide range of molecules of low hydrophilicity and suitable geometrical size through noncovalent host−guest interactions. Hence, CD can find applications in numerous domains like pharmaceutics, cosmetics, food, catalysis or environmental protection.

We studied extensively inclusion complexes with numerous volatile compounds (VOC, aroma, essential oils) in aqueous solutions and developed various methods to characterize these inclusion complexes[2,3].

We recently investigated the possibility to combine the properties of CD and deep eutectic solvents (DES)[4]. DES are a new generation of green solvents reported for the first time in 2003[5]. The term DES is commonly used to describe low melting point liquids formed by combining organic salts and hydrogen-bond donor (HBD) components. We were able to solubilize various CD in the DES based on choline chloride:urea (1:2) and demonstrated that inclusion properties of CD were maintained in this DES[4,6]. To this date, few examples of inclusion complexes formation were reported in solvents other than water.

Finally, low melting mixtures were obtained by mixing levulinic acid and various CD derivatives. CD also retained their inclusion ability in the resulting solvent. These new systems gave rise to a new family of solvents that we called SUPRADES[7,8].

In this conference, we'll present an overview of our main results.

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